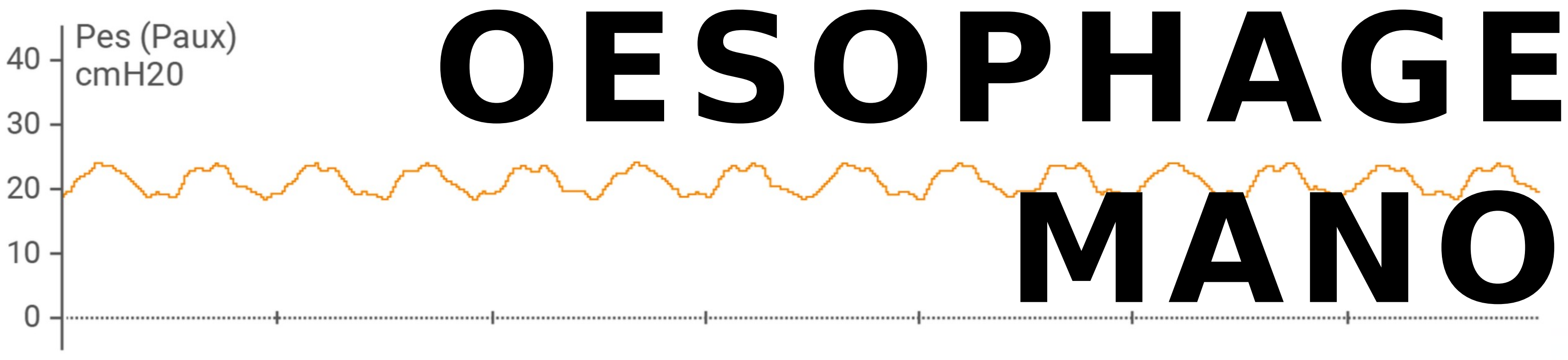
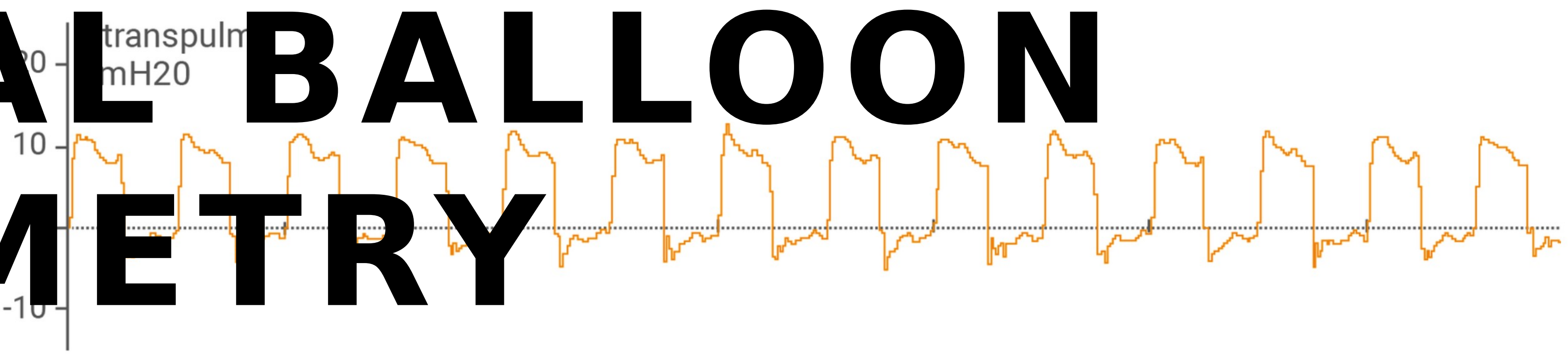
OESOPHAGEAL BALLOON MANOMETRY





What is it?

Oesophageal Balloon Manometry is the use of a balloon inserted into the oesophagus nasally or orally to measure oesophageal pressure. This is used as a surrogate of pleural pressure[1,2] to facilitate calculation of the transpulmonary pressure required to distend a patient's chest wall and lungs[3].

This allows for individualisation of ventilation settings and accurate, objective adjustment of PEEP while minimising risk of Ventilator Induced Lung Injury[4,5,6].

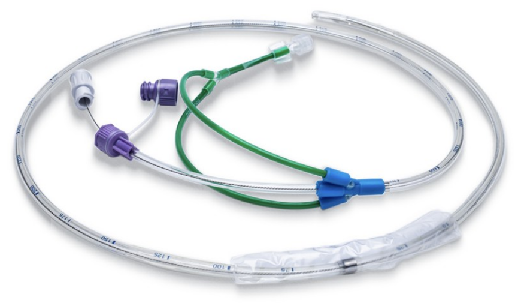
A brief history:

First documented in 1877 when Luigi Luciani described using a catheter to measure oesophageal pressure and using that as a surrogate for pleural pressure [7].

In 1949 JH Buytendijk presented a thesis on intraoesophageal pressure and lung elasticity at The University of Groningen [8].

This theory was researched and supported in the early 1950s and has since been used to further advance our understanding of lung mechanics, ventilation and respiratory failure.

Indications:



ARDS

Obesity

Lung/Thorax Surgery

Abnormal Thorax Anatomy
(congenital or disease)

Use with caution:

Large Pleural Effusion

Contraindications:

Children

Pharyngeal or Oesophageal lesions

Bleeding Risk
(Oesophageal Varices, Low Platelets, etc.)

Trauma
(Skull, Neck or Maxillofacial fractures)

Pregnant or Breastfeeding women

How to insert & calibrate:

(NutriVent multifunction nasogastric catheter & Hamilton C6 Ventilator with a passively ventilated patient)

1: Ensure Sidam NutriVent™ catheter pack sealed & in date.

2: Open package and connect 3 way tap and syringe.

3: Inflate balloon with 6ml air. Squeeze balloon to check intact. Deflate balloon.

4: Estimate length of tube to insert by measuring from end of balloon places at xiphoid, across to patient's earlobe and on to tip of nose (usually 50-60cm).

5: Lubricate guidewire and insert into purple gastric port.

6: Check Pes (Oesophageal Pressure) waveform on Hamilton C6S ventilator shows 0cmH2O (±0.5cmH$_2$O).

7: Attach to ventilator's Pes port.

8: Insert catheter in same manner as normal NG Tube to depth estimated in step 4.

9: Connect provided syringe to 3 way tap and completely deflate balloon.

10: Open 3 way tap to ventilator, air & syringe.

11: Inflate balloon with 6ml air.

12: Remove 2ml air (4ml remains).

13: Close 3 way tap to syringe.

14: Ensure waveforms on ventilator set to 66 seconds.

15: While watching Pes waveform, slowly withdraw catheter until cardiac oscillations appear.

16: Perform a Dynamic Occlusion Test:

16a: Perform Expiratory hold.

16b: Push on patient's chest.

16c: Changes in Pes and Paw (Airway Pressure) waves should be the same or within 20% ratio of each other (Pes : Paw = 0.8 - 1.2).

17: If changes in Pes and Paw are not within 20% tolerance, progressively pull back the catheter, 3-5cm at a time until cardiac oscillations on Pes are less visible. Repeat step 16 until within tolerance.

18: Secure catheter to nose.

19: Order and perform Chest Xray. Two Doctors must confirm & document correct placement.

20: Remove guidewire and cap gastric port or connect NG feed.

21: Perform Expiratory hold and monitor Ptranspulm (Transpulmonary Pressure).

POSTER

trate PEEP as necessary - Ptranspulm should
cmH$_2$O at end of expiration for optimal PEEP

BIBLIOGRAPHY

Measurement is valid for 1 hour.

Repeat again as clinically necessary.

References

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3: Arnal, J-M., Garnero, A. and Karjaghli, M. (2015) 13 Expert Tips – Esophageal Pressure Measurement. 2nd edn. Switzerland: Hamilton Medical AG. Available at: https://tinyurl.com/3xc6tj3x (Accessed: 25th August 2024).

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5: the PLeUral pressure working Group (PLUG—Acute Respiratory Failure section of the European Society of Intensive Care Medicine) et al. (2016) 'Esophageal and transpulmonary pressure in the clinical setting: meaning, usefulness and perspectives', *Intensive Care Medicine*, 42(9), pp. 1360–1373. doi: 10.1007/s00134-016-4400-x.

6: Slutsky, A. S. (1999) 'Lung injury caused by mechanical ventilation', *Chest*, 116, pp. 9S-15S. doi: 10.1378/chest.116.suppl_1.9S-a.

7: Luciani, L. (1877) *Delle oscillazioni della pressione intratoracica e intraddominale*. Torino: Tipografo di S. M. e RR. Principi. Available at: https://tinyurl.com/mr6wwyyu (Accessed: 25th August 2024).

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